

[0022] In a further embodiment of any of the foregoing engines, the first turbine section has between about 3 and 6 stages.

[0023] In a further embodiment of any of the foregoing engines, a pressure ratio across the first turbine section is greater than about 5:1.

[0024] In a further embodiment of any of the foregoing engines, includes a power density greater than about 1.5 lbf/in³ and less than or equal to about 5.5 lbf/in³.

[0025] In a further embodiment of any of the foregoing engines, the second turbine includes at least two stages and performs at a first pressure ratio. The fan drive turbine includes more than two stages and performs at a second pressure ratio less than the first pressure ratio.

[0026] Although the different examples have the specific components shown in the illustrations, embodiments of this disclosure are not limited to those particular combinations. It is possible to use some of the components or features from one of the examples in combination with features or components from another one of the examples.

[0027] These and other features disclosed herein can be best understood from the following specification and drawings, the following of which is a brief description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] FIG. 1 is a schematic view of an example gas turbine engine.

[0029] FIG. 2 is a schematic view indicating relative rotation between sections of an example gas turbine engine.

[0030] FIG. 3 is another schematic view indicating relative rotation between sections of an example gas turbine engine.

[0031] FIG. 4 is another schematic view indicating relative rotation between sections of an example gas turbine engine.

[0032] FIG. 5 is another a schematic view indicating relative rotation between sections of an example gas turbine engine.

[0033] FIG. 6 is a schematic view of a bearing configuration supporting rotation of example high and low spools of the example gas turbine engine.

[0034] FIG. 7 is another schematic view of a bearing configuration supporting rotation of example high and low spools of the example gas turbine engine.

[0035] FIG. 8A is another schematic view of a bearing configuration supporting rotation of example high and low spools of the example gas turbine engine.

[0036] FIG. 8B is an enlarged view of the example bearing configuration shown in FIG. 8A.

[0037] FIG. 9 is another schematic view of a bearing configuration supporting rotation of example high and low spools of the example gas turbine engine.

[0038] FIG. 10 is a schematic view of an example compact turbine section.

[0039] FIG. 11 is a schematic cross-section of example stages for the disclosed example gas turbine engine.

[0040] FIG. 12 is a schematic view an example turbine rotor perpendicular to the axis of rotation.

DETAILED DESCRIPTION

[0041] FIG. 1 schematically illustrates an example gas turbine engine 20 that includes a fan section 22, a compressor section 24, a combustor section 26 and a turbine section 28. Alternative engines might include an augmentor section (not shown) among other systems or features. The fan section 22

drives air along a bypass flow path B while the compressor section 24 draws air in along a core flow path C where air is compressed and communicated to a combustor section 26. In the combustor section 26, air is mixed with fuel and ignited to generate a high pressure exhaust gas stream that expands through the turbine section 28 where energy is extracted and utilized to drive the fan section 22 and the compressor section 24.

[0042] Although the disclosed non-limiting embodiment depicts a turbofan gas turbine engine, it should be understood that the concepts described herein are not limited to use with turbofans as the teachings may be applied to other types of turbine engines; for example a turbine engine including a three-spool architecture in which three spools concentrically rotate about a common axis such that a low spool enables a low pressure turbine to drive a fan via a gearbox, an intermediate spool enables an intermediate pressure turbine to drive a first compressor of the compressor section, and a high spool enables a high pressure turbine to drive a high pressure compressor of the compressor section.

[0043] The example engine 20 generally includes a low speed spool 30 and a high speed spool 32 mounted for rotation about an engine central longitudinal axis A relative to an engine static structure 36 via several bearing systems 38. It should be understood that various bearing systems 38 at various locations may alternatively or additionally be provided.

[0044] The low speed spool 30 generally includes an inner shaft 40 that connects a fan 42 and a low pressure (or first) compressor section 44 to a low pressure (or first) turbine section 46. The inner shaft 40 drives the fan 42 through a speed change device, such as a geared architecture 48, to drive the fan 42 at a lower speed than the low speed spool 30. The high-speed spool 32 includes an outer shaft 50 that interconnects a high pressure (or second) compressor section 52 and a high pressure (or second) turbine section 54. The inner shaft 40 and the outer shaft 50 are concentric and rotate via the bearing systems 38 about the engine central longitudinal axis A.

[0045] A combustor 56 is arranged between the high pressure compressor 52 and the high pressure turbine 54. In one example, the high pressure turbine 54 includes at least two stages to provide a double stage high pressure turbine 54. In another example, the high pressure turbine 54 includes only a single stage. As used herein, a "high pressure" compressor or turbine experiences a higher pressure than a corresponding "low pressure" compressor or turbine.

[0046] The example low pressure turbine 46 has a pressure ratio that is greater than about 5. The pressure ratio of the example low pressure turbine 46 is measured prior to an inlet of the low pressure turbine 46 as related to the pressure measured at the outlet of the low pressure turbine 46 prior to an exhaust nozzle.

[0047] A mid-turbine frame 58 of the engine static structure 36 is arranged generally between the high pressure turbine 54 and the low pressure turbine 46. The mid-turbine frame 58 further supports bearing systems 38 in the turbine section 28 as well as setting airflow entering the low pressure turbine 46.

[0048] The core airflow C is compressed by the low pressure compressor 44 then by the high pressure compressor 52 mixed with fuel and ignited in the combustor 56 to produce high speed exhaust gases that are then expanded through the high pressure turbine 54 and low pressure turbine 46. The mid-turbine frame 58 includes vanes 60, which are in the core airflow path and function as an inlet guide vane for the low